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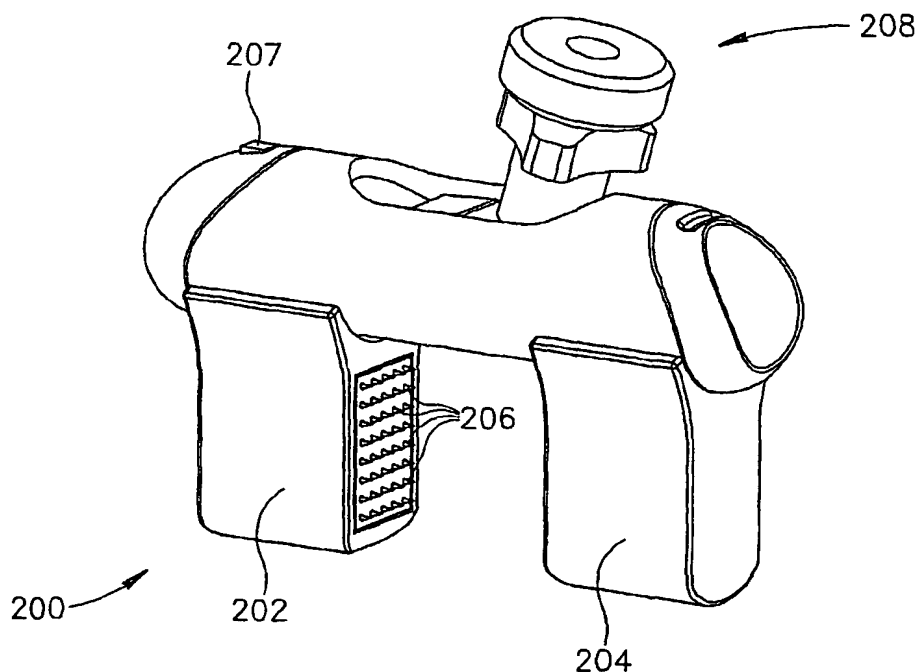
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[Continued on next page]

(54) Title: **HARD TISSUE SURFACE GEOMETRY DETERMINATION**



(57) Abstract: Apparatus for measuring a surface geometry of hard tissue covered by a layer of soft tissue, including a plurality of elements each having a tip adapted to penetrate said soft tissue and not substantially penetrate said hard tissue; a frame supporting movement of said elements, each along a path, such that a plurality of said tips, when positioned along the paths, define a surface; and at least one position sensor which generates a signal indicative of a tip position of at least one of said elements.



TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG).

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INTERNATIONAL SEARCH REPORT

International application No.

PCT/IL04/00062

A. CLASSIFICATION OF SUBJECT MATTER

IPC(7) : A61C 19/04, 3/00

US CL : 433/72, 75

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

U.S. : 433/72, 75, 76; 33/553, 554, 561.1

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)
Please See Continuation Sheet

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	US 5,176,516 A (KOIZUMI) 05 January 1993 (05.01.1993), see entire document.	1-46, 51-77
Y	US 5,865,769 A (CASE et al) 02 February 1999 (02.02.1999), see entire document.	1-46, 51-77
Y	US 5,257,184 A (MUSHABAC) 26 October 1993 (26.10.1993), see entire document.	23, 25-29, 55-60, 63-75
Y	US 3,861,049 A (MULLER) 21 January 1975 (21.01.1975), column 5, lines 1-15.	40-42, 76, 77
Y	US 4,998,881 A (LAUKS) 12 March 1991 (12.03.1991), column 4, lines 51-69.	44-46, 51, 52, 65-71
Y	US 6,402,707 A (ERNST) 11 June 2002 (11.06.2002), column 13, lines 30-45.	54, 70
Y	US 5,725,376 A (POIRIER) 10 March 1998 (10.03.1998), column 6, lines 16-25.	61
X	US 5,800,168 A (CASCIONE et al) 01 September 1998 (01.09.1998), see entire document.	78
Y		68

☒ Further documents are listed in the continuation of Box C.

See patent family annex.

* Special categories of cited documents:

"A" document defining the general state of the art which is not considered to be of particular relevance

"E" earlier application or patent published on or after the international filing date

"L" documents which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)

"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"T"

later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X"

document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y"

document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art

"&"

document member of the same patent family

Date of the actual completion of the international search

09 April 2005 (09.04.2005)

Date of mailing of the international search report

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INTERNATIONAL SEARCH REPORT

International application No.
PCT/IL04/00062

C. (Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 4,941,826 A (LORAN et al) 17 July 1990 (17.07.1990), see entire document.	79-81
X	US 5,597,304 A (RAY et al) 28 January 1997 (28.01.1997), see entire document.	79-81

INTERNATIONAL SEARCH REPORT

International application No.

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Box No. II Observations where certain claims were found unsearchable (Continuation of item 2 of first sheet)

This international search report has not been established in respect of certain claims under Article 17(2)(a) for the following reasons:

1. ☐ Claims Nos.:
because they relate to subject matter not required to be searched by this Authority, namely:
2. ☐ Claims Nos.:
because they relate to parts of the international application that do not comply with the prescribed requirements to such an extent that no meaningful international search can be carried out, specifically:
3. ☐ Claims Nos.:
because they are dependent claims and are not drafted in accordance with the second and third sentences of Rule 6.4(a).

Box No. III Observations where unity of invention is lacking (Continuation of item 3 of first sheet)

This International Searching Authority found multiple inventions in this international application, as follows:
Please See Continuation Sheet

1. ☒ As all required additional search fees were timely paid by the applicant, this international search report covers all searchable claims.
2. ☐ As all searchable claims could be searched without effort justifying an additional fee, this Authority did not invite payment of any additional fee.
3. ☐ As only some of the required additional search fees were timely paid by the applicant, this international search report covers only those claims for which fees were paid, specifically claims Nos.:
4. ☐ No required additional search fees were timely paid by the applicant. Consequently, this international search report is restricted to the invention first mentioned in the claims; it is covered by claims Nos.:

Remark on Protest

☐
☒

The additional search fees were accompanied by the applicant's protest.

No protest accompanied the payment of additional search fees.

INTERNATIONAL SEARCH REPORT

International application No.

PCT/IL04/00062

BOX III. OBSERVATIONS WHERE UNITY OF INVENTION IS LACKING

This application contains the following inventions or groups of inventions which are not so linked as to form a single general inventive concept under PCT Rule 13.1. In order for all inventions to be examined, the appropriate additional examination fees must be paid.

Group I, claim(s) 1-77, drawn to an apparatus and method for measuring the surface of hard tissue under soft tissue.

Group II, claim(s) 78-81, drawn to a dental surgical stent.

The inventions listed as Groups I and II do not relate to a single general inventive concept under PCT Rule 13.1 because, under PCT Rule 13.2, they lack the same or corresponding special technical features for the following reasons: The Group II invention does not require the measuring structure, for example, tissue penetrating elements required by the Group I invention.

Continuation of B. FIELDS SEARCHED Item 3:

BRS

search terms: measuring, display, guide, manufacturing, limit, wireless, drill, sleeve, depth, adhesive, lock, friction, prevent, penetrate, soft, tissue, bone, point, stop, register